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Interactive comment on "Protein analysis in dissolved organic matter: what free proteins from soil leachate and surface water can tell us – a perspective" *by* W. Schulze

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Reply to Referee #3: Referee #3 had the following specific comments and questions: - "the manuscript lacks little bit of the arbitrary choice of samples..." This study is a first overview - the aim was to analyze samples from different soils and regions, mainly as a survey. Indeed, as referee #3 assumed, follow-up work is now being carried out which is embedded in different experimental setups. I hope to be publishing resuts in experimental contacts in future.

- "however, for a better understanding of the samples and their context in the environment, am more strainght forward description of samples is necessay" Yes, I agree, this is a valid suggestion. Therefore DOC concentration, total carbon, and nitrate concentration is summarized in an additional table 1. In the Results section, I then refer to this table. Unfortunately, due to the diversity of samples, not all parameters are available

for all samples.

- "it would be more useful to first present the method / data of decomposing plant litter, then water flux starting with rain, followed by soil DOC and finally stream DOM" Thanks to Referee # 3 for this suggestion. I will make changes to the Methods section and included a summarizing paragraph also in the results (see below).

- "Can there any speculations be done about the origin or composition of the 70% proteins not characterized?" I am not sure if I actually understand what exactly the question aims at. There are two aspects about "proteins not characterized": Firstly, the term "not characterized" refers to all those proteins, which are known to exist from DNA-sequencing events, but their biological function is not known. In figure 7 (new figure 3) these proteins are marked as "hypothetical" - thus their organism of origin is known, but they cannot be attributed a cellular function, although they probably have one. Secondly, I do find peptide sequences, that cannot specifically be attributed to one particular organism, since they come from highly conserved proteins (e.g. actin). These proteins are marked "unknown" or "unclassified" in the pie charts.

- "... the author can make a little better use of the wealth of papers investigating DOM dynamics with alternative methods, mostly degradative and non-degradative chemical analyses" I will include a more detailed Results and Discussion paragraph concerning the Siberia sampling site (Tura), which also deals with DOM dynamics.

- "Since for the Tura site the author has informationa bout the decomposing material, surface DOM, and soil leachate DOM, at this site the fate of DOM can be discussed a bit deeper, concerning the link of the soid and dissolved organic matter." An new paragraph will be included in the Results section describing the relationships of DOM fingerprints at this site. This led to a new figure, which will be added to the Results section. Briefly, the comparison reveals that the DOM composition of samples with similar water dynamics (top soil leachates versus deeper soil leachates, low water run-off versus high water runoff) show similar patterns of protein origin.

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- "... soils have extreme small scale heterogeneity" and "reproducability of a method is better to do multibpel analyses of the same sample" The samples analyzed were actually a mixture taken from different lysimeters at the same sampling site. Thus, some heterogeneity is leveled out anyway. In addition, the small scale heterogeneity may be reflected more on the species level, which is not resolved in this analysis - yet. This has been added to the results section. In addition, reproducibility had also been tested by the different analyses of the same sample, which were reproducible. I will add this statement to the revised version.

- "When assesing the DOM composition of subsoil solutions or stream samples, it would always be advantageous to know something about the water flow..." This question will be addressed in a new paragraph about the Tura site, as water discharge had been measured there. The results are summarized in a new figure.

- "Sorption may be a reason why no exoenzymes have been detected" I would have actually expected all proteins of a given size and charge to be subject to sorption, and I would imagine that exoenzymes are not specifically different from other enzymes in that respect. However, it may well be that in reality exoenzymes belong to a class of proteins that somehow have higher tendencies to sorption, thereby increasing the probability for detection by mass spectrometry in the particulate samples rather than in the free solution. This aspect will be added in the Discussion.

The technical comments will be implemented and corrected.

Interactive comment on Biogeosciences Discussions, 1, 825, 2004.